Shrinking Planets Illusions

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Abstract: Proposed approach is based on the idea of shortening of linear measurement standards caused by the Earth shrinking. This approach permits us to predict some features of the Universe: spontaneous growth of distance between two resting objects detected by an observer at one of these objects, velocity/distance dependence is known to meet the Hubble Law, constancy of any solid body linear dimensions in time and equality of absolute values of gravitational braking and of illusive acceleration of galaxies is believed to be caused by linear measurement standard shortening some 6-8 billion years ago.

Key-Words: Linear measurement standard shortening, Planet shrinking, Illusion of solid body dimensions constancy, Spontaneous growth of distance, Gravitational braking, Moon’s diameter shortening.

1 Introduction
This paper develops further a concept presented in [1], i.e. ideas based on the linear measurement standards, which are shortening with time. Meter is one of the most popular linear measurement standards, its length is strongly connected with the size of the Earth: designating distance between the North Pole and Equator by the surface of the Earth on the Paris longitude as “d”, one meter is determined as $10^{-7} \cdot d$. Thus we imply, that diameter of the Earth is shortening with time as well. Below we also show that shortening of the Moon’s diameter [2] discovered in August 2010 with the use of the images obtained by the Lunar Reconnaissance Orbiter Camera has similar trait to those of the Earth.

2 Symbols, assumptions and definitions
Below the following symbols and definitions are used:
- $t$ – running time;
- $T$ – Universe lifetime;
- $r$ – linear measurement standard used;
- $R_i$ – true distance between an observer and $i$-th object;
- $L_i$ – distance to be fixed between an observer and $i$-th object as a ratio of $R_i$ to the linear measurement standard ($r$):

$$L_i = \frac{R_i}{r}; \quad (1)$$

- $H$ – Hubble constant [3]:

$$1.618 \cdot 10^{-18} \leq H \leq 3.2 \cdot 10^{-18} \text{(sec.}^{-1}) \quad ; \quad (2)$$

Below we also use $H$ value meeting (2):

$$H \approx \frac{1}{T} \text{ (sec.}^{-1}); \quad (3)$$

- $\gamma$ – gravitational constant;
- $\rho$ – average density of the Universe matter;
- $\Re$ - radius of visible Universe;
- $M$ - mass of matter in the Universe:

$$M = \frac{4}{3} \pi \rho \Re^3; \quad (4)$$

$I$ – a set of space objects indices, for which is true the Hubble Law.

Further we suppose that for each distance measurement process is used linear measurement standard value corresponding to the measurement time. This condition is not important in the case of small distances measurement – in this case it is fulfilled automatically, but for astronomical
distances, when information transfer time is comparable with the Universe lifetime, its role is known to grow.

3  General concept
Keeping in mind that \( r \) value is variable, detected by an observer velocity of interval value \( L_i \) change due to (1) is equal to:

\[
\forall i : r \frac{dL_i}{dt} = \frac{dR_i}{dt} - \frac{R_i}{r} \frac{dr}{dt}. \tag{5}
\]

As for the space objects meeting the Hubble Law detected by an observer velocities are exceeding peculiar velocities of corresponding objects:

\[
\forall i \in I : r \frac{dL_i}{dt} \gg \frac{dR_i}{dt}, \tag{6}
\]

system (5) can be transformed as follows:

\[
\forall i \in I : r \frac{dL_i}{dt} \approx -\frac{R_i}{r} \frac{dr}{dt}. \tag{7}
\]

Combining (1), (7) and Hubble Law, we get the system:

\[
\begin{cases}
\forall i \in I : \frac{dL_i}{dt} \approx H L_i; \\
\forall i \in I : r \frac{dL_i}{dt} \approx -\frac{R_i}{r} \frac{dr}{dt}; \\
\forall i : L_i = \frac{R_i}{r},
\end{cases} \tag{8}
\]

with the following solution:

\[
\begin{align*}
\{ r &= r_0 \cdot \exp \{-H t\}; \\
\forall i \in I : L_i &= L_{0,i} \exp \{H t\} ,
\end{align*} \tag{9}
\]

where:

\[
L_{0,i} = \frac{R_i}{r_0},
\]

\( r_0 \) - linear measurement standard \( r \) value if \( t=0 \).

Equation (9) results in the following features of solid bodies:

- as shortest distance between any two points of a solid body can be used as a linear measurement standard, linear dimensions of any solid body are exponentially decreasing functions of time meeting (9);
- as linear measurement standards are changing according to the same laws, as the measured objects, observers do not detect these changes directly.

4  The Moon and the Earth
Shortening of the Moon’s diameter \( D \) during the \( \Delta t \) period equal to about 0.8 billion years [2] permits us to determine the value of the Hubble constant for the Moon \( H_M \) using (9):

\[
H_M = \frac{\ln D_0 - \ln D}{\Delta t}, \tag{11}
\]

where \( D_0 \) is equal to the Moon’s diameter 0.8 billion years ago.

Keeping in mind that during this period \( D \) shortening is equal to 110 – 182 m., \( H_M \) value being contained in the range \( 1.255\cdot10^{21} - 2.076\cdot10^{21} \) (sec.\(^{-1}\)).

Vyacheslav Orlenok, professor of geology at the Kant Russian State University in Kaliningrad, comparing relief structures 4.5 billion years ago, when Earth’s surface had just started to solidify, to those of today, found that its average radius was equal to \( R = 6,956 \) km, and has since reduced by value \( \Delta R = 585 \) km.[4]. This permits us to determine the value of the Hubble constant for the Earth similar to (11) keeping in mind that “\( t \)” value is equal to 4.5 billion years:

\[
H_E = \frac{\ln \frac{R}{R - \Delta R}}{t} \approx 3.48 \cdot 10^{-18} \text{ (sec}^{-1}). \tag{12}
\]

Comparison of \( H_E \) with (2) diapason shows that \( H \) and \( H_E \) values are close.

5  Resulting illusions
Illusion of constancy in time of any solid body linear dimensions is not the only product of (9) – (10) system. Below are presented examples of resulting system (9) – (10) illusions in measurement of distances, velocities and acceleration in astronomy.

5.1 Distance
Analyzing fixed $L_0$ distance between two resting in coordinate system $O_1$ space objects when one or both of them have shortening linear measurement standard values meeting (9), an observer at the one of shrinking objects using shortening linear measurement standard $r$ of “his” object, will detect growing with time distance value $L = \frac{R_0}{r}$, coinciding with (10). In other words, if there is no external influence upon each of two resting in coordinate system $O_1$ space objects, one of them being shrinking, an observer at the latter, using coordinate system $O_2$ of “his” object, and its shortening linear measurement standard, will discover spontaneous growth of distance between these objects meeting (10).

5.2 Velocity
Substituting the equation of (9) in (6), and denoting the velocity of real distance value $R$ change as $V$, while denoting fixed by an observer velocity $r \frac{dL}{dt}$ as $V_0$, we can determine $V$ value as follows:

$$V = V_0 - HR.$$  

The dependence of the galaxies velocities values $V_0$ on $R$ corresponds to the Hubble Law [3], whereas dependence $V$ on $R$ is corresponding to the peculiar velocities. Thus the Hubble Law can be explained by shortening of the Earth linear measurement standard values including its diameter, resulting in comparatively stable Universe.

5.3 Acceleration
We shall further analyze two components of accelerated movement of galaxies at the edge of visible Universe: component “g” of acceleration vector, caused by the gravitational braking, and opposite directed component “a” being resultant of linear measurement standard shortening:

$$\begin{align*}
\alpha &= -H^2\mathcal{R}; \\
g &= \frac{3}{4} \pi \gamma \mathcal{R} \rho,
\end{align*}$$

(14)

Keeping in mind (3) the total acceleration value ($\alpha$) can be determined as follows:

$$\alpha = \mathcal{R} \left( \frac{1}{T^2} - \frac{4}{3} \pi \gamma \rho \right).$$

(15)

As about $6 - 8$ billion years ago $\alpha$ had value equal to zero, true is the following equality:

$$\frac{4}{3} \pi \gamma \rho (T_1) = \frac{1}{T_1^2},$$

(16)

where $T_1$ is equal to the Universe lifetime $6 - 8$ billion years ago ($T_1 \approx 6 + 7$ billion years).

Designating nowadays lifetime of the Universe as $T_2$ and taking into account that:

$$\begin{align*}
\rho (T_2) &= \frac{3}{8 \pi T_2^2}; \\
T_2 &\approx 2T_1,
\end{align*}$$

(17)

it’s easy to show that $\rho (T_1) \approx 8 \rho (T_2)$.

(18)

Now it’s possible to show that according to system (16) – (18) absolute values of the gravitational braking “g” and of illusive acceleration “a” caused by the Earth linear measurement standards shortening, coincided $6 - 8$ billion years ago.

6 Conclusions and questions
The above presented approach allows us to formulate a few questions and to make the following conclusions:

1. Solid bodies on the Earth are spontaneously shrinking: shortest distance between any two points of such a body is spontaneously shortening according to equation (9).
2. In the case of absence of any external influence upon each of two resting bodies, one of them being shrinking, an observer at the latter will discover spontaneous growth of distance between these bodies as in (10).
3. Hubble Law can be explained by shortening of the Earth diameter $D_E$, thus ignoring the idea of dark energy distribution in the Universe.

4. Taking into account only the velocities of galaxies, it is possible to say that the Universe is more stable than it was earlier assumed. And finally two questions:
   a) Is it possible to expand the above findings to other space objects?
   b) As the weight measurement standard – kilogram is determined as the weight of a cubic decimeter of water, thus depending on linear measurement standard value, is it possible to detect a corresponding loss of weight by the Earth proportional to the $\pi D_E^2 \rho_E$ value each small time unit? Here $\rho_E$ is equal to the average density of the Earth matter.

References:


